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MANAGEMENT SUMMARY

FOR THE

FUNCTIONAL REQUIREMENTS ANALYSIS

for the

Bureau of Land Management

ADP Modernization Project

April 1986

Contract AA852-CT5-15

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MANAGEMENT SUMMARY

Overview and Purpose

This document identifies the Bureau of Land Management's functional requirements for automated data processing (ADP) support. This analysis is the first major deliverable produced under American Management Systems' contract to support BLM's ADP Modernization Project, a multi-year effort managed by the Division of Information Resource Management to improve the Bureau's ADP capabilities. Figure 1 depicts the tasks to be performed under AMS's contract. AMS's work will be completed by the end of fiscal 1987, with new ADP equipment being installed beginning in approximately 1989.

Required BLM Actions: BLM should review this deliverable to ensure that it identifies the Bureau's major functional requirements and workloads. BLM does not need to make any decisions regarding the scope or structure of ADP architectures at this time.

Methodology and Limitations

Functional requirements analysis is the first task of the BLM ADP Modernization Project. The requirements in this document are based on interviews with BLM managers and staff and on reviews of procedures manuals, computer system outputs, annual reports, and other materials provided by BLM.

AMS conducted interviews in BLM's Washington Office (WO) during September of 1985. Interviews were generally scheduled in a "top-down" sequence, starting with the Assistant Director, three Deputy Directors, and seven Assistant Directors, and continuing with personnel in each WO division and office. In each division, the division chief and up to six branch chiefs and senior staff members were typically interviewed.

After completing Washington Office interviews, AMS visited a number of BLM field offices to interview field personnel and collect relevant documentation. Project team members visited the Denver Service Center, four State Offices, six District Offices, and eight Resource Area Offices during September and October. These offices were selected by BLM to provide a reasonable cross-section of the Bureau's field operations.

The structure and content of the Functional Requirements Analysis have been designed to meet the needs of the ADP Modernization Project while remaining within the project's schedule and budget. In particular, the ADP Modernization Project is a strategic planning effort -- its purpose is to define the best overall ADP architecture for the Bureau, not to analyze specific application systems in detail. Readers should therefore be aware of several limitations of this document:

- This analysis covers major organizational functions with a significant impact on the Bureau's ADP environment -- it does not address every one of BLM's activities.

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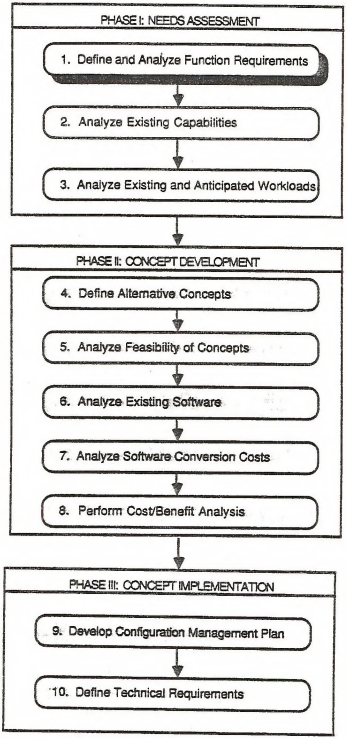
Figure 1 AMS has begun work on all three Needs Assessment Tasks.


PHASE I: NEEDS ASSESSMENT
1. Define and Analyze Function Requirements
2. Analyze Existing Capabilities
3. Analyze Existing and Anticipated Workloads
PHASE II: CONCEPT DEVELOPMENT
4. Define Alternative Concepts
5. Analyze Feasibility of Concepts
6. Analyze Existing Software
7. Analyze Software Conversion Costs
8. Perform Cost/Benefit Analysis
PHASE III: CONCEPT IMPLEMENTATION
9. Develop Configuration Management Plan
10. Define Technical Requirements
Key:
Task Completed
Task In Progress
Task Not Yet Begun

- The functional requirements in this document are described at an extremely aggregate level.
- Functional requirements should be viewed as opportunities for improving the efficiency and effectiveness of BLM's operations, not as mandatory automated capabilities.
- Each functional requirement does not necessarily correspond to a single application system.
- We have not attempted to document in detail the exact procedures used by BLM offices to achieve programmatic objectives.
- This document is not intended to cover requirements for office automation.

Summary of BLM Functional Requirements

We defined requirements for a total of 67 functional areas within BLM. The objective was to generate information for use in an ADP planning and acquisition project, not to support systems development. The functional areas are major BLM activities, like competitive oil and gas leasing, timber sales, and financial reporting. Thus, this analysis will also act as a business model of BLM for general use throughout the ADP Modernization Project.

Figure 2 lists summary information about each functional area. For each area, the body of the analysis provides detailed descriptions of BLM's operations, user needs, workload volumes, and existing systems.

There are several different ways to view BLM's needs at a summary level -- by program area, by organizational level (i.e., Washington Office, State Office, District Office, Resource Area Office), by type of system, and by the types of requirements associated with programs that already have some automated support. The remaining parts of this section briefly discuss BLM's functional requirements from each of these perspectives.

Requirements by Program Area

At a summary level, BLM can be divided into three major programmatic areas: Energy and Mineral Resource; Lands and Renewable Resources; and Managemnet Services. Because of programmatic differences and variations in the extent to which each area has developed automated systems in the past, the nature of BLM's functional requirements differs across the three areas:

- **For the 22 functions identified in Energy and Mineral Resources,** systems like ORCA, Case Recordation, MCRS, MS-1, and SLMS provide a reasonable basis for management reporting and operations support, although most need enhancements to better meet user needs. Only the salable minerals program seems to lack an effective baseline data system. Energy and minerals personnel are also using locally developed microcomputer-based

Figure 2 AMS identified 67 functions in the three BLM program areas.

FUNCTIONAL REQUIREMENT	RESPONSIBLE WO DIVISION	SIZE/SCOPE	Automat EXISTING SYSTEMS
ENERGY AND MINERALS			
Competitve Oil and Gas Leasing	WO-620	879 leases in FY84	None
Over-the-Counter Oil and Gas Leasing	WO-620	2,419 leases in FY84	None
Simultaneous Oil and Gas Leasing	WO-620	4,295 leases in FY84	SIMO
Maintain Oil and Gas Lease Files	WO-630	115,000 active leases	None
Drainage Detection Program	WO-630 WO-690	5,099 cases identified in FY85	PI/GEM-1
Identify and Delineate Known Geological Structures	WO-630 WO-690	900 KGSs awaiting evaluation	PI/GEM-1
Process Unit and Other Agreement Applications	WO-630	578 agreements approved in FY85	None
Oil and Gas Inspection and Enforcement	WO-504	25,000 inspections in FY85	MS-1
Regional Activity Planning for Coal Leasing	WO-650	6 Federal Coal Regions	None
Coal Leasing	WO-650	Average 16 leases/year from FY78 and FY84	None
Preference Right Leasing for Non-Energy Leasable Minerals	WO-650	Dozens of leases each year	None
Competitive Leasing for Non-Energy Solid Leasable Minerals, Tar Sands, and Oil Shale	WO-650	2 leases in FY84	None
Maintain Solid Minerals Lease and Mine Files	WO-660	1,000 active leases	SLMS
Solid Leasable Minerals Regulatory Requirements	WO-660	Few violations	SLMS
Solid Leasable Minerals Inspection and Enforcement	WO-660	Thousands of inspections each year	SLMS
Mining Claims	WO-680	1.4 million active claims; 142,000 claims filed in FY84; 363 claims patented in FY84	MCRS
Salable Minerals	WO-680	1,200 negotiated/ contract/free-use; 2,500 sales from non-exclusive use sites	VMADPRS Material Sales
Adjudicate Energy and Mineral Leasee	WO-620 WO-650	63,000 cases in FY84	ORCA, Case Recordation Sys
Administer Waste Management Program	WO-501	unknown -- estimated thousands of sites	None
Coordinate with Minerals Management Service	WO-630 WO-660	N/A	MS-1, SLMS, MMS systems
Support BLM Resource Management Planning	All WO divisions	153 Resource Areas	None
Provide Policy, Procedures, and Overall Program Management for Energy and Mineral Resources Functions	All WO divisions	N/A	Various

Figure 2 (Continued)

FUNCTIONAL REQUIREMENT	RESPONSIBLE WO DIVISION	SIZE/SCOPE	EXISTING SYSTEMS
o Track R&D Projects	WO-201	1000 Projects	ASPEN/2 Data Base
o Planning Guidance	WO-201	165 Plans	GIS
o Resource Program Oversight	WO-ALL	9 Programs	Misc. programs on Wang PC
o Land Records Management	WO-321	7.5 million Records	
o Land Case Processing	WO-321 WO-322 WO-330 WO-341	48,500 Cases 435,590 Acres	Case Recordation and ORCA
o Resource Programs Planning	WO-221 and all Programs	165 RMP	GIS
o Grazing Authorization and Billing	WO-220	13,053 (Sec 3) Permits 7,550 (Sec 15) Leases	RMAS
o Range Land Monitoring	WO-220	Unknown	ASPEN/2 data bases
o Land Improvements	WO-220 WO-230 WO-240 WO-321	93,190 Jobs 34,329 Forest Improvements 649,955 Wildlife Habitats 12,401 Recreation Sites	JOR STORMS SageRam
o Land Resource Inventory	WO-220 WO-230 WO-240 WO-250 WO-341 WO-342		GIS ESI IDS WOMS STORMS MICRO-STORMS RAIDS T&E IHICS Wang PC data bases
o Timber Appraisal	WO-230	Appraisals on 1,129,979 board feet	Forest Inventory
o Timber/Material Sales	WO-230	Sales of $117,000,000	o Western Oregon Timber Information System o STORMS o Material Sales
o Wild Horses and Burros	WO-250	51,148 Horses Adopted Adopted	o AOOPT
o Wildlife Habitat Protection	WO-240	1,866 Improvements 255 Miles Improved 38,874 Acres Improved	o T & E o IHICS o RAIOS
o Recreation and Wilderness Management	WO-341 WO-342	12,401 Recreation Sites 918 Wilderness Areas	o ASPEN /2 Data Bases o Wang PC Data Bases
o Culture	WO-341		o Miscellaneous ASPEN/2 Data Bases
o Studies	WO-220 WO-230 WO-221 WO-240 WO-341 WO-342		o ASPEN/2 Data Base

Figure 2 (Continued)

FUNCTIONAL REQUIREMENT	SIZE/SCOPE	EXISTING SYSTEMS
MANAGEMENT SERVICES		
Financial Handling Accounts	130,000 Payments/Yr.	FMS
Financial Reporting	N/A	FMS
Incident Investigation and Reporting	4,000 Outstanding Cases 63 Law Enforcement Agreements	LIDS LEADS
Conduct Cadastral Surveys	119,005 acres surveyed 1,844,151 resurveyed	Cadastral Field Notes in DSC and Colorado
Maintain Cadastral Field Notes	1,423,144,011 acres	Cadastral Field Notes in DSC and Colorado
Track Use of Outside Agency Funds	89,513 acres surveyed 777,576 resurveyed	FMS
Cartographic Services	341 million acres to Map	MOSS IDEMS ORCA
Facility Construction and Maintenance	15,000 buildings 406 recreation areas 55,097 cub ft dikes/yr 1,351,900 linear ft. of pipe/yr.	JDR FMS HEC 4 & HEC 5 Dam Safety System
Transportation System Design and Maintenance	65,000 miles of road	RDS - Forest JDR FMS
Predict, Prevent, and Fight Wildfire	Over 1 million acres a year burn	AFFIRM BEHAVE IAMS Fire Reporting Sys
Coordinate BLM Aircraft Requirements	$40M/yr	OAS Reporting Sys
Report EEO Compliance	10,000 BLM staff	FMS PAY/PERS
EEO Conflict Resolution	146 complaints/yr.	FMS PAY/PERS
Safety Reporting and Inspection	5,000 vehicles	Safety Records System - DSC
Personnel and Payroll Management	2,000 actions/yr	PAY/PERS Vacancy List SF52 Tracking Table of Org.
Position Management	10,800 BLM Positions Audit 25%/yr	PAY/PERS SF52 Tracking Table of Org.
Employee Development	75-200 records/State 10,000 BLM Staff	Training Catalog Tracking System Track. Sys. - Oregon
Contract Preparation and Control	30 Contracts/staff 90 Contract/Staff in Oregon	PITS - Oregon Bidders Lists PTS - DSC PO Track - Montana

Figure 2 (Continued)

FUNCTIONAL REQUIREMENT	SIZE/SCOPE	EXISTING SYSTEMS
Fleet, Property, and Facility Management	5,000 Vehicles 110,000 Personal Property $500M Real Property	APPS - DSC APPS - Colorado Motor Vehicle Sys Director's Digest
Information Systems Management	13 ADP Centers	None
Telecommunications Management	125 Telephone Companies	Freq Mgmt System
Records Management	185,203 cu ft of records 77,063 Magnetic tapes	Corres Cntl - Montana Library Ref Sys On-line Comp Lib Ctr Direct. & Memo System Controlled Mail Sys.
Organizational Analysis	N/A	FMS PAY/PERS WBO Matrix MBO System
Program Evaluation	3 Management, 4 Program and 8 Tech/Admin Evaluations/Yr.	None
Budget Development	$418,000,000 Budget/Year	FMS WBO Matrix MBO
Budget Operations	$418,000,000 Budget/Year	FMS WBO Matrix
Exterior Liaison Queries	N/A	None
Exterior Liaison Document/Material Preparation	N/A	None

systems, BLM's Geographic Information System, and commercial software from Petroleum Information (PI) Corporation to perform resource analyses -- economic evaluations, oil and gas field mapping, well log analysis, and drainage screening. These efforts, however, face potential difficulties, especially in integrating different capabilities and data bases to analyze the same land. For example, field offices have trouble transferring well location and log data from the PI IBM-based systems to the Data General and Hewlitt-Packard GIS software. **Thus, the overall need in energy and mineral resources is to enhance and improve existing management reporting and operations support systems and to implement automated tools for economic and geological analysis in the field.**

- **For the 17 functions identified in Lands and Renewable Resources,** most program areas have at least some ADP support, ranging from large mainframe applications to locally developed data bases. Lands and renewable resources functions still have many disparate needs not now being met by automated systems. The most urgent need for all land functions is for geographic data combined with land characteristics data. There is also a need for tracking systems to improve the management of BLM's land planning, monitoring, and improvement functions. There is a need for socio-economic and resource management modeling and data analysis for the planning and studies functions in all the land resource programs. The Resource Science staff and Wildlife staff would like textual data to accompany the statistical data they already have. The Land Title Records management function in the Eastern States Office needs an automated land records system. **Thus, the overall need in land and renewable resources is to automate select land coordinate and characteristic data to support all functions; provide tracking systems to support RMP development and land planning, monitoring, and improvement; provide modeling tools to select functions; and automate the ESO Land Title Records.**

- **For the 28 functions identified in Management Services and the Office of the Director,** systems like PAY/PERS, the Financial Management System, and the Automated Personal Property System provide a reasonable basis for management reporting, although these systems need to provide more reporting flexibility, better data credibility, and improved timeliness to support administration in the field. Simple administrative tracking systems are needed in many management services programs to track key dates, activities, or actions. Some tracking systems exist now (such as the Job Documentation and Reporting System and SF 52 Tracking Systems) but these systems need improvement to fit users' needs. Systems for the same purposes are now being developed independently in different field offices, resulting in duplicative and often incompatible systems. Some administrative functions -- such as procurement and real property accounting -- are currently performed without any substantial ADP support. Technical services personnel are making extensive use of external analytical systems, such as the Forest Service's Road

Design System, BEHAVE fire modeling system, or HEC 4 and HEC 5 hydrology analysis systems for analyses such as fire response planning, dam and road design, and stores inventory analysis. **Thus, the overall need in management services is to enhance and improve existing management reporting and support systems, including ad hoc reporting; improve data credibility, data entry, and data communication; coordinate system development activities in different field offices; and to prepare and implement a comprehensive strategy for providing tools for technical analysis in the field.**

Requirements by Organizational Level

BLM is organized into four levels: the Washington Office; 12 State Offices; approximately 55 District Offices; and about 151 Resource Area Offices. Each level of the organization has distinct responsibilities in implementing BLM's programs, although there is substantial variation from office to office in terms exactly where a specific activity is performed.

Washington Office. BLM's Washington Office (WO) is primarily responsible for policy, procedures, guidance, overall program management, and responding to questions from other agencies, Congress, and the public. WO is not involved in operations. Accordingly, functional requirements at the Washington Office level are for management reporting and summary statisitics, ad hoc inquiries, and effective communications with field offices.

State Offices. BLM's 12 State Offices typically provide administrative services (e.g., personnel, procurement) for their component District Offices. In addition, State Offices are responsible for monitoring overall accomplishments for lands under their jurisdiction and for performing selected operational functions (e.g., energy and minerals adjudication, mining claims administration, land records maintenance). Functional requirements at the State Office level are for administrative systems, for workload statistics describing operations at lower organizational levels, and for case processing and operations support capabilities. A State Office needs good communications with its Districts, but does not normally share large amounts of data with other States.

District Offices. District Offices perform some administrative functions (e.g., personnel actions for temporary employees, some engineering work). In addition, Districts are the primary level for economic and geological analysis and other operations in the energy and minerals program. In lands and renewable resources, Districts are responsible for certain case processing tasks and for some resource analysis (e.g., timber appraisals). District Office functional requirements are therefore focussed on case processing, workload tracking, and land and resource inventory and analysis capabilities.

Resource Area Offices. Resource Areas are almost totally operational in their responsibilities, with administrative and technical services provided by District and State Offices. Resource Areas perform and track land management, improvements and resource inventories, issue grazing permits and leases, and prepare Resource Management Plans. Resource Area functional requirements are for land and resource inventory and analysis capabilities and for case processing and workload tracking.

Requirements by Type of System

The functional requirements identified in our analysis can be divided into three types by the nature of the system that would be needed: administrative, case/operations processing, and land and resource inventory and analysis. BLM has different requirements in each of these areas:

- **Administrative Systems.** BLM's 28 functional requirements for administrative support are met by an existing core of automated systems -- the Financial Management System, PAY/PERS, the Automated Personal Property System, and so on. Although some functions (e.g., contracting and procurement) receive little automated support, BLM's primary need in the area of administrative systems is to improve and enhance the capabilities now in place.

- **Case/Operations Processing Systems.** Case and operations processing systems are those used on a day-to-day basis by BLM personnel to record information about the status, history, and actions on BLM land. At the extreme, case/operations processing systems are the foundation for performing certain functional activities. While ORCA and CRS are the primary starting points for case/operations processing systems within BLM, there are still significant unmet needs in this area. Case/operations processing capabilities need to be expanded into new functions (especially in lands and renewable resources) and enhanced to provide more features to a larger number of BLM personnel. We identified 54 case and operations systems, some of which are also classified as land and resource inventory and analysis systems.

- **Land and Resource Inventory and Analysis Systems.** BLM's most extensive and sophisticated needs are in the area of land and resource inventory and analysis capabilities. Systems of this type would provide automated support to BLM users in activities such as KGS and drainage analysis, Resource Management Planning, environmental impact analysis, and lease boundary delineation. The hardware, software, data collection, and operating costs of automated systems to provide these capabilities in a responsive, on-line environment are extremely high. Conversely, systems providing these features offer the potential for reducing the amount of highly skilled labor needed to perform many BLM functions and improving dramatically the quality of BLM's outputs. We identified 16 land and resource inventory and analysis systems, some of which are classified under case/operations processing systems.

Additional Requirements in Programs with Existing Automated Systems

As shown by Figure 2, fifty-two of BLM's functions are currently supported by ADP systems. Even where existing systems are operational, however, the entire range of user needs is often not being met. In some cases, resource

limitations prevented systems development efforts from addressing the full range of user needs. In other instances, requirements have shifted over time, creating a mismatch between user needs and system capabilities. Finally, the falling price of ADP hardware makes it possible to provide automated features that earlier may have been too expensive to implement.

For programs supported by existing systems, the most common additional requirements included:

- On-line data entry, validation, and posting.
- Expanded data bases to encompass more information types and additional information for each record.
- Better data administration and quality control.
- Increased focus on operations support rather than management reporting.
- More timely information.
- Improved management reporting and on-line inquiry capability.
- Analysis to eliminate existing unused data.

Obviously, these results do not apply to all of BLM's systems. Some systems appear to meet program needs quite well. In other cases, BLM staff recognize the limitations of existing systems and are working to improve them within the limits of available resources.

Important Results of the Functional Requirements Analysis

The detailed information provided for each of the 67 functional requirements will be used in conjunction with other information on existing ADP capacity utilization as the basis for projecting BLM's needs for ADP hardware, software, and communications. A consideration of alternative ADP architectures should address not only the Bureau's aggregate requirements for each system resource, but also how those resources should be organized into a practical, coherent structure.

This section identifies the key results of our analysis and discusses their impact on future tasks. In attempting to assess the issues likely to be important later in the project, however, it should be stressed that we are not pre-judging the analysis; it is too early to make even preliminary decisions on ADP architecture, acquisition strategies, and similar topics.

- **BLM's field operations are performed at different organizational levels in different State Offices.** BLM State Office Directors have significant discretion in deciding the organizational level -- State, District, or Resource Area -- at which many program functions will be performed. It is difficult, if not impossible, to create an accurate model of a "typical" field office. The appropriate amounts and types of ADP hardware will differ significantly, even among offices at the same level. Furthermore, it may be most cost-effective to meet the requirements of colocated offices with a common set of ADP hardware, rather than providing each unit with independent equipment.

- **Some of the functional requirements identified can be satisfied through a completely automated system only at a high cost.** Some requirements -- particularly those associated with resource analysis and inventory using computerized mapping and high-quality spatial graphics -- are extremely costly in terms of hardware, software, operations, and data collection. The costs and benefits associated with the automation of those requirements must be carefully studied before BLM makes a final decision on whether to implement automated solutions. In many instances, the best solution may entail both manual and automated operations to meet users' requirements most cost-effectively.

- **Some BLM field offices are located in extremely remote spots where ADP resources and support may not be readily available.** BLM's State Offices are typically located in medium or large cities (e.g., Sacremento, Santa Fe, Portland, Denver, Boise, and Billings). District and Resource Area Offices, on the other hand, are often located in small towns hundreds of miles from the nearest large metropolitan area. This problem is ameliorated somewhat by the fact that many BLM offices are co-located.

- **Many of the unmet functional requirements and ADP problems that we identified cannot be attributed solely to hardware capacity limitations.** In our interviews, we found that some -- but not all -- users cited on-line response time or batch job turnaround (the most common indicators of capacity constraints) as major problems. Users more frequently identified difficulties in areas such as ADP training, speed and reliability of telecommunications, configuration management, data entry (including use of U.S. Mail for communications), terminal incompatibilities, communications with ADP staff, and ADP specialist recruiting and retention.

- **There is a vast backlog of unmet demands for systems capabilities.** Few, if any, BLM programs are fully supported by existing ADP systems. Existing systems typically need to be enhanced to meet users' requirements, and additional systems are needed to support functions now performed entirely by hand. The backlog of requirements appears to be greatest in the area of work tracking and land/resource inventory and analysis.

- **With some exceptions, overall program growth is expected to be low.** BLM's mission, functions, and workloads are relatively stable. Most Bureau programs have shown little growth in the last five years; some may even be entering a period of shrinking workload (e.g., some energy leasing activities). Most of the BLM managers that we interviewed anticipated steady-state operations for at least the next several years, even though some areas (such as wilderness management) may grow significantly. While some policy changes are possible (e.g., legislation requiring competitive bidding on all oil and gas leases), their net impact would not be large. In the next five to ten years,

the amount of land managed by BLM is expected to shrink significantly as the Bureau completes transfers of land in Alaska.

- **Most of the detailed land/resource inventory and analysis data used by BLM organizations is collected and used locally -- there is a moderate need for sharing with other BLM offices up and down the hierarchy and relatively little need for data exchange among offices at the same level.** BLM offices at different levels do exchange workload statistics, case records, and (in some cases) land/resource inventory and analysis data. Different BLM offices at the same level share workload or case processing information, and exchange land/resource inventory and analysis data only in special situations and when dealing with cases in boundary areas.

- **BLM's unmet functional requirements revolve around performing existing functions more thoroughly, with higher quality, and at a lower cost.** In most programs, new ADP systems are not necessary to allow BLM to meet its mandatory legislative obligations and internal management objectives. Few BLM programs are experiencing major problems -- rapidly increasing backlogs, sharply rising unit costs, deteriorating work quality, and extreme criticism from outside constituencies. Over the next few years, however, BLM is likely to experience increased pressure to justify its decisions more rigorously.

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